REMARKS

The Office Action of January 8, 2009 was received and carefully reviewed. Claims 1-4, 6-10, 12-16, 18-22, 24-28, 30-34 and 36-100 were pending prior to the instant amendment. By this amendment, claims 55, 82, and 86 are amended. Consequently, claims 1-4, 6-10, 12-16, 18-22, 24-28, 30-34 and 36-100 are currently pending in the instant application, of which, claims 92-98 are withdrawn. Reconsideration and withdrawal of the currently pending rejections are requested for the reasons advanced in detail below.

The Examiner's indication of allowable subject matter with respect to claims 1-4, 6-10, 12-16, 18-22, 24-28, 30-34, 36-54 and 99-100 is gratefully acknowledged. However, for the reasons advanced herein, it is respectfully submitted that all of the pending claims are allowable.

Initially, the Examiner is again thanked for the courtesies extended during the Examiner's Interview held on April 20, 2009. During the interview, Applicant's representative presented proposed claim language directed to overcoming the cited prior art.

In the outstanding Office Action, claims 55-91 were rejected under 35 U.S.C. §103(a) as being unpatentable over Nitta et al. (US. Patent No. 6,304,329, hereinafter Nitta) in view of Sasaki et al. (U.S. Patent No. 5,213,654, hereinafter Sasaki) and Miyanaga et al. (U.S. Patent No. 5,808,321, hereinafter Miyanaga). Nitta, Sasaki, and Miyanaga, however, fail to render the claimed invention unpatentable. Each of the claims recite a specific combination of features that distinguishes the invention from the prior art in different ways. For example, independent claim 55 recites a combination that includes, among other things:

> *"leveling a surface of the crystalline semiconductor film by irradiating the crystalline semiconductor film with a laser beam in a gas selected from at least one of a hydrogen and an inert gas . . ."*

Independent claim 76 recites a further combination that includes, for instance,

> *"irradiating the crystalline semiconductor film with a laser beam in a gas selected from at least one of a hydrogen and an inert gas so that a difference between top and bottom points of the roughness of the surface of the crystalline semiconductor film is 6 nm or less."*

Independent claim 82 recites another combination that includes, for instance,

> *"leveling a surface of the crystalline semiconductor film by irradiating the crystalline semiconductor film with a linear laser beam in a gas selected from at least one of a hydrogen and an inert gas . . ."*

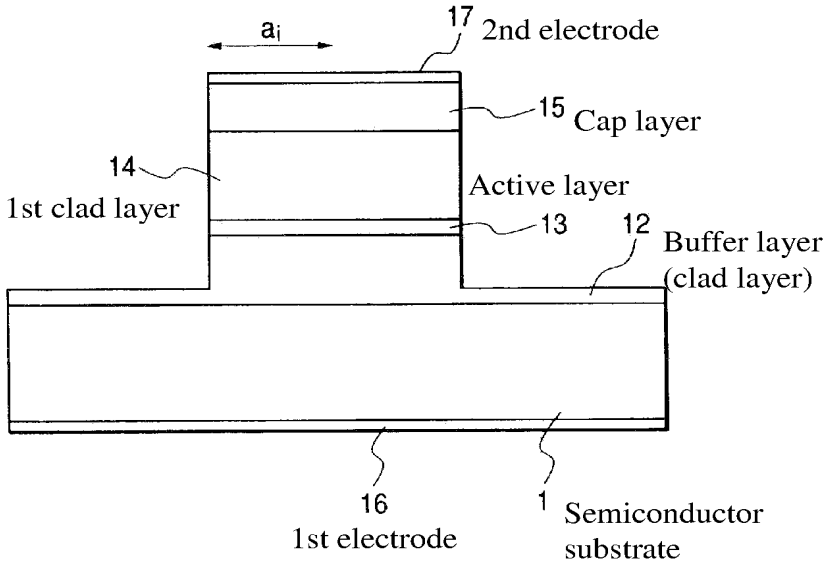
Independent claim 86 recites a further combination that includes, *inter alia*,

> *"supplying a gas on a side of the substrate which faces toward the stage and floating the substrate over the stage by the gas . . ."*

At the very least, Nitta, Sasaki, and Miyanaga, whether taken alone or in combination, fail to disclose or suggest any of these exemplary features recited in independent claims 55, 76, 82 and 86.

Turning to the cited prior art, Nitta merely discloses a gyro having a laser diode wherein crystal growth is executed on a semiconductor substrate so as to obtain the layer configuration shown, for example, in FIG. 2 by the existing crystal growth technique such as MOCVD (e.g., see Nitta col. 8, lines 13-16). Additional substrates may be employed (as described, for example, at col. 8, line 65-col. 9, line 3) including SOI (Silicon On Insulator). According to Nitta, "[e]mployable for forming the active layer, etc. of the semiconductor laser are liquid phase epitaxy (LPE), molecular beam epitaxy (MBE), metal organic vapor-phase epitaxy (MOCVD or MOVPE), atomic layer epitaxy (ALE), metal organic molecular-beam epitaxy (MOMBE), chemical beam epitaxy (CBE), etc." (e.g., see. col. 9, lines 4-10). Accordingly, FIG. 2 of Nitta is shown:

FIG. 2



Generally, a silicon film of SOI may include a crystalline silicon. Applicant recognizes that Nitta discloses forming a crystalline semiconductor film over an insulating surface (SOI). However, Nitta fails to disclose irradiating the crystalline semiconductor film with a laser beam, as recited in Applicant's claims. At best, Nitta can only provide irradiating by a molecular beam to deposit the layers shown in FIG. 2.

During the interview, it was pointed out, by Applicant's Representative, that an express purpose of the invention, *inter alia*, is to level the surface of the crystalline semiconductor film. In order to perform the aforementioned surface leveling, a prescribed atmospheric condition and laser power must be met. To achieve the aforementioned atmospheric condition, at least one of a hydrogen and an inert gas is selected as claimed. To meet the criteria of laser power, the invention utilizes a laser beam for irradiating the crystalline semiconductor film, as claimed.

To that end, Nitta merely discloses a gyro and a semiconductor device having a plurality of laser diodes. As was outlined during the interview (and in the previous response (filed on October 27, 2008)), the abstract of Nitta, details that "the gyro has a ring resonator type laser diode, and which detects a beat signal attendant on rotation, a plurality of laser diodes are disposed on an identical substrate, thereby to exhibit a wide detection range for angular velocities. A semiconductor device includes a plurality of ring resonator type laser diodes, each of which undergoes a voltage change or a change in a driving current in attendance on a magnitude of an applied angular velocity when subjected to constant-current drive, and which are disposed in a single frame or on a single substrate. In the semiconductor device, the ring resonator type laser diodes may be disposed on an identical surface of the single substrate."

On page 4 of the outstanding Office Action, the Examiner alleges Nitta describes "irradiating the crystalline semiconductor film with a laser beam (Nitta col. 12 line 63)." However, at best, the device of Nitta employs components including, for example, a semiconductor substrate 1 and first, second and third ring resonator type laser diodes 52, 53 and 54. It appears that the Examiner alleges that items 52, 53 and 54 of Nitta are laser beams irradiating a semiconductor film. However, as was pointed out during the interview, the features 52, 53 and 54 (such as shown in FIG. 12) of Nitta are, in fact, laser diodes (also called semiconductor lasers) that are provided in order to detect the angular velocity of other objects. Furthermore, the disclosed laser diodes of Nitta are specifically utilized in a ring resonator in a gyro(e.g., see col. 12, lines 24-29); thus, the device of Nitta is not in the same field of endeavor as claimed by Applicant. Furthermore, Nitta merely discloses how the laser diodes 52, 53 and 54 are made (e.g., see steps 1 through 5 at col. 8, lines 13-35) as opposed to how they are used. Applicant's Representative expressly pointed out that the laser diodes of

Nitta cannot generate enough energy to manufacture the semiconductor device by irradiating the crystalline semiconductor film with a laser beam as recited in the claims. Thus, Nitta does not disclose irradiating the crystalline semiconductor film with a laser beam, and, hence, it is, therefore, impossible (emphasis added) for Nitta to level a surface of the crystalline semiconductor film, as recited, for example, in claims 55 and 82.

Furthermore, on page 4 of the Office Action, the Examiner readily admits that Nitta "does not specifically mention laser irradiation in a gas selected from at least one of a hydrogen and an inert gas." In an attempt to cure the deficiencies of Nitta, the Examiner turns to the disclosure of Sasaki. Sasaki discloses a vapor-phase epitaxial growth method for group III-V compound semiconductor crystal layers, for example, in EXAMPLE 1 and FIG. 2, (InAs)1 (GaAs)1 crystal layers grown on InP substrate as follows:

Gas introducing tube 5	Gas introducing tube 6	Substrate temperature set by radio-frequency heating device	Excimer laser irradiation
H_2	TMG	350℃	Yes
	H_2		No
	AsH_3		Yes
	H_2		No
	TM1		No
	H_2		No
	AsH_3		No
	H_2		No

The (InAs)1 layer is formed of TM1 and AsH_3. and (GaAs)1 layer is formed of T

MG and AsH_3. It is known that, where the excimer laser is not used for the growth of crystal layers, the substrate temperature suitable for the growth of a monoatomic layer is 500℃ in the case of GaAs, and 400℃ in the case of InAs (Col. 4, lines 55-59). The excimer laser is used for forming the (GaAs)1 layer which needs higher temperature than the (InAs)1 layer.

It appears that Sasaki may disclose irradiating the crystalline semiconductor film (InP substrate) with a laser beam, but does Sasaki fails to disclose or fairly suggest leveling a surface of the crystalline semiconductor film itself, as recited in Applicant's claims.

Furthermore, Sasaki discloses controlling the thickness of a specific crystal layer, however, Sasaki can merely control the thickness on a monoatomic scale by means of vapor-phase epitaxy. Accordingly, Sasaki's film controlled thickness on a monoatomic scale (~0.1 nm order) does not cure the roughness, because Sasaki's film would overcome the roughness of the crystalline semiconductor film. Even more, for a roughness of a crystalline semiconductor film 6 nm or less (for example, as recited in claim 76 and new claim 101), Sasaki's film would certainly fail to control the thickness due to its monoatomic scale limitations.

On page 10, the Examiner refers to FIG. 1 of Sasaki in an attempt to meet the claimed features. However, upon close review, Sasaki merely discloses a substrate 13 placed on a suscepter 4 wherein gas is introduced via introduing tubes 5 and 6. Thus, Sasaki fails to disclose or fairly suggest supplying a gas on a side of the substrate and floating the substrate over the stage by the gas as recited, for example, in claim 86.

Additionally, the Examiner readily admits, on page 5 of the Office Action, that Nitta and Sasaki fail to "specifically mention its laser treatment is for the purpose of forming a crystallized semiconductor film." Accordingly, the Examiner turns to the disclosure of Miyanaga in an attempt to cure the deficiencies of the base references. At best, Miyanaga discloses three steps of laser annealing in a First Embodiment as follows:

(1) Laser annealing to improve crystallization by reducing defect in the crystalline silicon film (e.g., col. 10, lines 46-67);

(2) Laser annealing to improve the interface between the gate insulating film and the crystalline silicon film (e.g., col. 11, lines 22-38); and

(3) Laser annealing to activate impurities giving n-type (e.g., col. 12, lines 10-25).

In the above laser annealing steps (1)-(3), Miyanaga fails to disclose or fairly suggest the atmosphere or leveling a surface of the crystalline silicon film as recited in the claims.

In accordance with the M.P.E.P. § 2143.03, to establish a *prima facie* case of obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. In re Royka, 409 F.2d 981, 180 USPQ 580 (CCPA 1974). "All words in a claim must be considered in judging the patentability of that claim against the prior art." In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 196 (CCPA 1970). Therefore, it is respectfully submitted that neither Nitta, Sasaki, nor Miyanaga, taken alone or in any proper combination, discloses or suggests the subject matter as recited in claims 55, 76, 82 and 86. Hence, withdrawal of the rejection is respectfully requested.

Each of the dependent claims depend from one of independent claims 55, 76, 82 or 86 and are patentable over the cited prior art for at least the same reasons as set forth above with respect to claims 55, 76, 82 and 86.

In addition, each of the dependent claims also recites combinations that are separately patentable.

In view of the foregoing remarks, this claimed invention, as amended, is not rendered obvious in view of the prior art references cited against this application. Applicant therefore requests the entry of this response, the Examiner's reconsideration and reexamination of the application, and the timely allowance of the pending claims.

In discussing the specification, claims, and drawings in this response, it is to be

understood that Applicant in no way intends to limit the scope of the claims to any exemplary embodiments described in the specification and/or shown in the drawings. Rather, Applicant is entitled to have the claims interpreted broadly, to the maximum extent permitted by statute, regulation, and applicable case law.

Should the Examiner believe that a telephone conference would expedite issuance of the application, the Examiner is respectfully invited to telephone the undersigned patent agent at (202) 585-8316.

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